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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/727,764 | 12/03/2003 | H. Grant Wang | 03-0041 BOE-63(1) | 7578 |

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WILDMAN HARROLD ALLEN & DIXON LLP
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CHICAGO, IL 60606

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| EXAMINER |
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HOLZEN, STEPHEN A

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| ART UNIT | PAPER NUMBER |
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3644

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS | 03/08/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| | | | |
|------------------------------|--------------------------------------|------------------------------------|--|
| Office Action Summary | Application No. 10/727,764 | Applicant(s) WANG ET AL. | |
| | Examiner Stephen A. Holzen | Art Unit 3644 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 4-15, 17-21, 23, 24, 27, 35 and 36 is/are pending in the application.
 4a) Of the above claim(s) 6-15 and 18-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4, 5, 17, 21, 23, 24, 27, 35, 36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to the rejection(s) of the claim(s) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made.

Applicant has argued that Hosick does not teach software that determines the attitude of the spacecraft based solely on the input received from one of the plurality of sensors. The examiner agrees that Hosick does not teach determining attitude from a single sensor input. Van Bezooijen does disclose however that attitude can be determine from a single sensor input. The examiner asserts that the claims do not read over the combination of references (as outlined below).

- 2. Claims pending: 1, 2, 4-15, 17-21, 23, 24, 27, 35, 36
- 3. Claims withdrawn: 6-15, 18-20
- 4. Claims Considered: 1, 2, 4, 5, 17, 21, 23, 24, 27, 35, 36

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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6. Claims 1, 2, 4, 5, 21, 27, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosick in view of Bezooijen (5,745,869).

Re – Claims 1, 2, 4, 5, 21, 27, 35, 36: Hosick et al discloses a satellite having an in-space thrust system having a pair of electric thrusters for orbit raising (transfer orbit), station keeping (on-station operation) and unloading momentum wheels. The satellite has an attitude controller that receives attitude information from the onboard sensor suit 32. The controller compares the sensor input with the sired attitude provides. Onboard sensor suite 32 comprises gyroscope (34) an earth sensor, a sun sensor and a star sensor (see Col. 6, lines 56-65). The examiner asserts that the plurality of sensors is capable of all being used for transfer orbit operations and on-station operations. The star tracker is capable of being used to determine spacecraft spin rate and attitude. The gyro is capable of being used to determine spacecraft spin rate and attitude. The sun sensors and solar panels disclosed by Hosick have been deemed to anticipate “solar panel current sensors” and are capable of being used to input the input to position of the spacecraft body for power safety after loss-of attitude. The sun sensors and solar panels disclosed by Hosick are inherently capable of validating attitude. The sun sensors and solar panels are inherently capable of being used to position the wing for power safety. (It is well known and old in the art to use solar panels current sensors to accomplish this act, and therefore the examiner views the Hosick reference as inherently having these capabilities. Note that it is the functional language that is inherent. The applicant has not positively claimed the structure.)

Although Hosick et al teaches that one of the primary objects of the present invention is to reduce the dependencies of chemical and liquid motors (i.e. bi-propellant) in favor of electric motors, Hosick never-the-less teaches that it is known in the art to use bi-propellant liquid

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motors for orbit transfer maneuvers. Therefore while Hosick et al teaches that electric motors are preferred especially for his invention, he does not teach completely away from using liquid bi-propellant motors.

Inherently any controller has “electronic equipment” and “software”. Controllers are programmable electrical devices.

It should be appreciated that the applicant’s functional language in the claims does not serve to impart patentability. While features of an apparatus may be recited either structurally or functional, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. Apparatus claims cover what a device is, not what a device does. A claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior apparatus teaches all the structural limitation of the claims. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-2 (Fed. Cir. 1997); Hewlett-Packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990); Ex parte Masham, 2 USPQ 2d 1647 (Bd. Pat. App. & Inter. 1987). The examiner asserts therefore that the star sensors are inherently capable of being the sole source attitude sensor data.

Hosick does not teach the capability of being able to determine attitude from a single sensor input.

Bezooijen teaches A detector (13), camera electronics (14), and computer (15) located on board the spacecraft (1) are used to generate a set of star match groups by matching pairs of stars observed by the detector (13) with pairs of guide stars from a stored database (18) of guide stars. The present invention is used for determining the attitude of a spacecraft 1 by means of sensing

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stars 2. It can be embodied in an autonomous star tracker, such as the Autonomous Star Tracker (AST) 10 being developed by Lockheed Palo Alto Research Laboratory in anticipation of the need for smart sensors capable of supporting autonomous, long-duration, space flight missions.

Detector 13 can be any type of sensor that measures intensity and position of objects in field of view 20, including an ICD or an active pixel sensor (APS). Attitude determination module 7 is then invoked to convert the position of the matched stars into the attitude of AST 10.

It would have been obvious to determine attitude from the input of a single detector, as taught by Beooijen for the purpose of increasing reliability of the system.

7. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hosick in view of the BOEING 702 fleet (publicly announced in October 1995, and launched in 1999). Hosick does not specifically disclose what the liquid motors are used for. However it has been known since at least October 1995 that satellites can combine electric, bi-propellant (liquid) and chemical engines for controlling the operations of a satellite. The BOE-702 satellites employ XIPS for final orbit insertions; liquid (bi-propellant) engines for lift the satellite into final orbit (orbit transfers). It would have been obvious to use the engines of the BOE 702 fleet on the thruster mounting configuration of Hosick for the purpose increasing versatility and maneuverability. (Alternatively the examiner could have rejected claims 1 and 17 over BOE702 in view of Hosick, where Hosick teaches that on-station and orbit transferring method steps).

8. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosick in view of Baghdasarian (6,010,096). Hosick does not disclose deployable solar arrays. Baghdasarian discloses that it is well known in the art to have solar arrays, which are deployable.

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(See Col. 3, lines 60+). It would have been obvious to one having ordinary skill in the art, at the time the invention was made to employ deployable solar wings for the purpose of reducing the area required for transporting the satellite to space (allowing it to fit within the payload bay of a shuttle).

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen A. Holzen whose telephone number is 571-272-6903. The examiner can normally be reached on M-F 8:30-5:00.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Teri Luu can be reached on 571-272-7045. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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 2/28/07


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